ADDIS ABABA SCIENCE AND TECHNOLOGY UNIVERSITY

COLLEGE OF ARCHITECTURE AND CIVIL ENGIENEERING

DEPARTEMENT OF URBAN PLANNING AND DESIGN

Conservation of the natural landscapes of Akaki Kality sub city

the case of Meshualekia

By

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Contents

Lists of Figures

Lists of Tables

Acronyms

CSA Center Statistical Authority

EPA - Environmental Protection Authority

EC - Ethiopian Calendar

Ha - Hectare

AACG - Addis Ababa City Government

HH - Household

GIS - Geographical information system

NGO -non-governmental organization

Abstract

This study aims to solve the current problems that arose from the degradation of natural resources with the perspective of urban planning and design of the urban landscape found in Akaki Kality sub city and gives appropriate solution recommendations on conservation of the landscape through the knowledge of landscape planning and design and different findings.

Among the methods I use to do my research, reading books written in relation to landscape conservation to find out what scientific progress has been done so far. In addition, I've a plan to visit local governmental institutions who could give me information on their previous works and future plans they have. Finally, questionnaires which will help to know what's in the peoples' mind about the topic also will be used.

So far, as the sub city is where my university belongs, I've tried to move around occasionally in the last 5 years and took some photos though it aimed my artistic view it's also advantageous to see the positive things that the landscapes of the area has. For instance, at the bridge found in kebele 09 which is usually called 'meshualekia' there are trees planted by the Akaki river and they are trees which has leaves that never fall the whole year making it aesthetically pleasant.

Acknowledgement

First of all I thank God for helping me survive in the challenging campus life with him. I would like to thank my advisor, Mekonnen Abebe not only for his criticism and comments on my work but also for understanding me my busy schedules and pushing me to do well. I would also like to thank my classmates for great discussions, ideas and criticisms. I would like to especially thank Endalkachew wondwosen for all his supports in my work in taking pictures of my site with his professional photo taking skills. I thank my parents, brother, sisters, and friends whom without their support, the finalization of this research would not have been real. Thank you all!

Chapter 1

1.Introduction

For many, across a range of disciplines, landscape has become both the lens through which the contemporary city is represented and a medium through which it's constructed. This tells us that it's a topic that should be seen seriously and demanding lots of investigation and research. That's why this report is needed.

Today in the context of Addis Ababa the rapid urbanization is continuing to decrease the density of nature specially forests found in the city. A recent study shows, the forest reserves of Ethiopia are estimated to be 2.5-3% of the total land though it's usually claimed that Ethiopia is a green pasture.(Taddesse, 1995). In my opinion, Addis Ababa also have contributed a lot to this loss to nature, with its rapid urbanization which didn't consider a thoughtful, sustainable landscape planning and design. Therefore, this issue is a big issue that should be studied to bring benefits to people.

What inspired me to do my research on this topic is to give cure to the current problems which even made the academic world and governments of the world be worried about the global warming and my personal artistic impression in landscapes. And finally, the verse that's found in one of the ancient books on earth made me even more passionate. It says, ''The Lord God put the man in the Garden of Eden to work the soil and take care of the garden.'' Genesis 2:15 which directly motivated me to contribute my own effort to the world around me in a smaller level.

1.1 Background /problem description

At present, the forest reserves of Ethiopia are estimated to be 2.5-3% of the total land, and about 100,000 hectares of forest are lost annually. About 1 billion tons of topsoil is also believed to be eroded annually. (Taddesse, 1995). This reality is clearly noticeable in Addis Ababa a growing and expanding capital of the country. Though there have been made lots of efforts to improve conservation of the natural landscapes there's still a lot of home work to on the conservation of it in order to create a successful city.

It is clear that landscapes with low conservation are unable to allow sustainable and successful urbanization. Deforestation and horizontal expansion of Addis Ababa the less or no attention given by the governors and

construction related professionals being added on it is bringing the city to a serious problem of its landscape. These all quest for the importance of Landscape conservation measures. Thus, it is increasingly recognized that adequate conservation of the landscape resources is a precondition for sustainable and successful urbanization particularly in the urbanizing parts of Ethiopia.

In general, the main problem that led to this research is absence of planned and thoughtful Landscape conservation which satisfies the needs of people to live in a livable and aesthetically pleasing environment.

1.2 Research question

- What are the major problems of meshualekias landscape from the basic human need perspective?
- What is the perception of landscape in Meshualekia?
- What are the different design strategies that can be adopted to make Meshualekia a naturally aesthetic and with functionally conserved landscape?

1.3 Research Objectives

1.3.1. General objective

Analyze the problems of Meshualekias landscape from landscape conservation perspective and provide solution that can be a base for other similar areas and enhance the aesthetics and livability of Addis Ababa.

1.3.2 Specific objectives

- Evaluate Meshualekia on landscape conservation
- Find out the major problems from analysis
- Adopt other countries successful practices and produce different landscape conservation method solutions for successful and sustainable urbanization.

1.4 significance of the research

This research contributes to a better understanding of landscape. It is also important to analyze and provide evidence on the existing condition of the landscape with respect to the peoples need and provide an amazing basis for areas where conservation intervention is needed. The study also points towards the use of artistic perspective with pointed out technical landscape conservation strategies to enhance image of the city and also satisfy needs of the public. The result can be useful for professionals and also institutions working on landscape conservation.

1.5 site selection criteria

The site of the research is selected based on different criteria which includes; aesthetic view, the existence of naturally grown and human planted trees in need of conservation, the existence of Akaki River that can be prevented from pollution and used up for the purpose of conservation itself. But the area highly characterized by the above written problems of lack of conservation and functionality in design and beauty. Those criteria are chosen because they are best locations for landscape conservation and enhance image of the city where the above problem highly observed in general.

1.6 Scope of the research

This research tries to review about the landscapes of Akakikality sub city but geographically it's limited to Meshualekias Bridge, which is selected because,

- It has a river and plantations grown by local people though the river by side is polluted,
- It has the potential for development of successful aesthetic landscape,
- It's also a place where people gather for selling livestock near holidays.

1.7. Limitation of the Study

The main challenges which can limit this study are Lack of well-organized and developed data from the sub city and wereda where the site is located, lack of financial resource for the research, more on shortage of time to conduct and analyze preferable and sufficient data.

1.8 Organization of the Research

The research is divided into five chapters. The First chapter gives a brief introduction to the issues the need for landscape conservation to the world, and specifically to Meshualekia. It describes the research objective, limitations, methodology and theoretical considerations for the study. The second chapter consists in detail about the literatuterevies on the topics of landscape definition, landscape conservation, models of protected landscapes. The third chapter describes the methods used to do the research. Selected Research methods Research Approaches, Primary Data type, Secondary Data types Data source and collection method. Chapter four presents the analysis of the different data. Findings of the study based on the researh area are also included. It discusses the different findings in accordance with the objective and question of the study. The last chapter contains recommendations based on the findings of the study and concludes with suggestions for issues to be considered when planning and designing future landscapes of Akaki sub city.

Chapter 2

2.Literature review

2.1 Landscape

2.1.1 Introduction

In this section of the literature review it introduces about landscapes including definitions, its relationship with other elements of city that are important to image ability of the city. Basic characteristics of successfully conserved landscape and different concepts related to landscape conservation are also discussed.

2.1.2 Definition

Landscape ecology by definition deals with the ecology of landscapes. So what are landscapes? Surprisingly, there are many different interpretations of the term “landscape.” The disparity in definitions makes it difficult to communicate clearly, and even more difficult to establish consistent management policies. Definitions of landscape invariably include an area of land containing a mosaic of patches or landscape elements (see below…thought to add pictures). Forman and Gordon (1986) defined landscape as a heterogeneous land area composed of a cluster of interacting ecosystems that is repeated in similar form throughout. Turner et al (2002) define landscape as an area that is spatially heterogeneous in at least one factor of interest. The landscape concept differs from the ecosystem concept in focusing on groups of ecosystems and the interactions among them – the focus is on spatial heterogeneity and its impact on process. There are many variants of the definition depending on the research or management context.

For example, from a wildlife perspective, we might define landscape as an area of land containing a mosaic of habitat patches, often within which a particular "focal" or "target" habitat patch is embedded (Dunning et al. 1992). Because habitat patches can only be defined relative to a particular organism's perception and scaling of the environment (Wien’s 1976), landscape size would differ among organisms. However, landscapes generally occupy some spatial scale intermediate between an organism's normal home range and its regional distribution. In-other-words, because each organism scales the environment differently (i.e., a salamander and a hawk view their environment on different scales), there is no absolute size for a landscape. From an organism-centered perspective, the size of a landscape varies depending on what constitutes a mosaic of habitat or resource patches meaningful to that particular organism; a landscape

could range in absolute scale from an area smaller than a single forest stand (e.g., an individual log) to an entire eco region. If you adopt this organism-centered definition of a landscape, a logical consequence of this is a mandate to manage habitats across the full range of spatial scales; each scale, whether it be the stand or watershed, or some other scale, will likely be important for a subset of species, and each species will likely respond to more than 1 scale.

The Landscape Concept – Structure and Function Regardless of how landscape is defined, the "concept" of a landscape is unequivocal. All landscapes have a user-defined structure (pattern) that is hypothesized to influence its function (Process). This interaction between spatial pattern and process defines the landscape concept. Landscape structure. –The structure of a landscape is defined by the particular spatial pattern being represented, and it consists of two components: composition and configuration. The composition of a landscape is defined by the spatial elements that are distinguished in the map and believed to be relevant to the landscape function under consideration. Composition represents the non-spatial aspect of a landscape, since only number and abundance of landscape elements is considered, not their spatial configuration. The configuration of a landscape is defined by the spatial character, arrangement and context of the elements. Configuration represents the spatial aspect of a landscape. Together these two components define the spatial pattern or heterogeneity of the landscape. Landscape function. –The function of a landscape is defined by the phenomena under consideration and can be a multitude of different things. In general, the services that landscapes provide to humans are functions and include things like providing for biological diversity, recycling nutrients, sequestering carbon, producing clean water, etc...

2.2The European Convention

According to the European Landscape Convention, "Landscape" means: "an area, as perceived by people , whose character is the result of the action and interaction of natural and/or human factors". Furthermore, The European Landscape Convention gives the following definitions: "Landscape policy" means an expr ession by the competent public authorities of general principles, strategies and guidelines that permit the t aking of specific measures aimed at the protection, management and planning of landscapes; "Landscape quality objective" means the response of the appropriate public authorities to the aspirations of the public for a specific landscape and the features of their surroundings

Landscape protection" means actions to conserve and maintain the significant or characteristic features of a landscape, justified by its heritage value derived from its natural configuration and/or from human acti vity;

“Landscape management” means action to ensure the regular upkeep of a landscape within a perspective of sustainable development so as to guide and harmonise changes which are brought about by social, eco nomic and environmental processes;

Landscape planning means strong forward-looking action to enhance, restore or create landscapes.

2.2.1 Ambiguity and landscape “wealth of the term “

Despite the above official definitions, landscape is still an ambiguous concept, with meanings of both the actual reality (the area) and also its perception. Landscape is a term found in heterogeneous disciplines lik e art (painting, music, literature), analytic disciplines, likegeographyand sociology and technical and scie ntific disciplines like economics, planning, town-
planning, architecture and even biology and natural sciences.Geographers emphasize the dynamic relatio nships among the physical context inhabited by man, the biological environment and the human action.

Natural Science and Ecology analyzes landscape through complex models that examine the different for ms of life in their habitat. Economists consider landscape as a support for resources or a resource itself.

The landscape of the sociologist is of a specifically social nature a context for social relationships. Urban planners see landscape as a crucial, specific context before and after the developments they implement. P ainters or writers remind us of the holistic character of the term landscape, far from the simple collection of composite elements. A new order appears and with it new values and different sensations. There emerg e two main and contrasting attitudes.

Landscape is interpreted according to the subjective sensibility and intuition of the artist.
This attitude may lead to excellent artistic expression. Here, I take the example of the famous painting by Jakob Philipp Hackert, Bridge in Venafro, 1786

Figure 1 Jakob Philipp Hackert, Bridge in Venafro, 1786

The artist bases the depth of analysis of the content of the landscape he paints on his own Philosophyand mindset those of the person commissioning the work. This aspect of knowledge and description, which ca n appear boring from the purely artistic point of view, is, instead highly worthwhile as an approach for an alyzing the landscape. This information kept my motivation alive and even improved it to a level that I should also try to paint the landscape of the research area am working on.

The painter portrays in great detail the components of the landscape: buildings, hamlets, the work of arts, bridges, thoroughfares, farm land and woods, with attention to the botanicals pecimens and the people, seen as coordinated actors and authors of the painted landscape.

2.3 Urban landscape plans

A new kind of planning tool has been recently developed in a number of different areas of Italy which ai ms to coordinate landscape conservation work. The urban landscape plan is a sort of comprehensive tool, which classifies the whole municipal territory by the varying degrees of its “sensibility” or “vulnerability ” to urban transformation. This classification leads to specific procedures of control and authorization. Th e Landscape Plan of Bolzano (Piano paesistico, 1999) is one of the first of this kind in Italy. Some subreg ional plans (for instance the Territorial Landscape Plan of the Province of Brescia in the Lombardy Regio n, approved in 2005) requires local authorities to improve and develop the surveys and implement the con sequent conservation measures provided by area-wide plans.

2.4 landscape conservation

Landscape conservation is a rapidly growing practice of people working together across large geographies, regardless of political boundaries, to conserve our natural and cultural heritage and ensure a sustainable future for both people and nature. It is an innovative and essential new conservation paradigm.Landscape conservation initiatives are long-term efforts generally characterized by a focus on:

1. Conservation of healthy ecological systems,
2. Use of science based and culturally sensitive conservation planning
3. Collaborative network structure (formal or informal) and
4. Meaningful multi sector engagement.

2.4.1 Protected landscapes

Protected landscapes are lived-in, working landscapes. The planning and management of these areas must be carried out in partnership with the local community. Local economic initiatives and the promotion of the local economy will shape conservation objectives. Community participation should be legally secured, and education and awareness-building about the objectives of the protected landscape within the community will be a priority. Without the support of the majority of the local community, the conservation objectives will not be realized.

Protected landscapes are about achieving conservation objectives in working landscapes. The concept of stewardship is fundamental to this approach. Stewardship means managing privately owned land on behalf of society as a whole, with future generations in mind. At the heart of the stewardship process lies the need to enter into agreements with landowners to secure and manage the land in the best interests of long-term environmental conservation. This interaction between people and the land in an environmentally, economically, and culturally sustainable relationship is beyond the reach of government alone. Stewardship programs must involve landowners, local communities, commercial operators, non-governmental organizations (NGOs), and government agencies.

Two factors are central to the success of the protected landscape:

• Effective conservation of the natural and cultural environment; and

• Continued viability of the local economy.

2.4.1.1 Protected landscapes, a protected areas model of the 20th century

National parks, nature reserves, and other protected areas now cover nine percent of the land surface of the world—equivalent to the combined areas of India and China. (Adrian Phillips Chair, IUCN World Commission on Protected Areas) This global network represents a priceless gift from this century to the

next. It gives future generations the assurance that at least some parts of the Earth will remain in a natural or near-natural state.

2.4.1.2 Finding the interface between cultural landscapes and protected landscapes

Cultural landscapes are at the interface between nature and culture. They represent the permanent interaction between humans and their environment, shaping the surface of the earth. With the rapid social and economic development cultural landscapes belong to the most fragile and threatened sites on earth. Adapted protection and proper management is urgently needed.

One of the contributions of cultural landscapes to World Heritage Site management is the recognition that inscription and ongoing conservation must involve the people who live in the designated area. The importance of local involvement in the processes and decision making related to cultural landscapes—from identification to description of their values, to nomination, implementation, educational role, and long-term outcomes is crucial to their sustainability. It is instructive to recognize how results differ between consultation and involvement. For a wide variety of reasons, involvement of associated people and communities in the identification of cultural landscapes, and the description of their values, is fundamental to an effective process for both the short- and the long-term management of these places.

A cultural landscape perspective explicitly recognizes the history of a place and its cultural traditions in addition to its ecological value. Thus, this approach is appropriate for places with a settlement history. A landscape perspective also recognizes the continuity between the past and present with people living and working on the land today. It explores how sense of place, cultural identity, and connections to the past can become touch-stones for deepening and broadening the impact and relevance of conservation. Concurrently, the concept of protected landscapes has advanced the practice and thought for natural area conservation. Today, the field of natural resource conservation recognizes an ecosystem approach and the importance of working with people, their knowledge of the local ecology, and their cultural traditions in developing conservation strategies. These concurrent developments in cultural and natural conservation have set the stage for a rethinking of landscape conservation and an unprecedented opportunity for collaboration.

2.5 What are the Concepts of Conservation Landscaping?

Conservation Landscaping is a term used to describe an approach to managing land by working with nature, rather than against nature. Conservation landscaping uses plants that are locally native - species that were present in the area at the time of European settlement. Using native plants, and reducing or eliminating turf grass leads to landscapes with less overall maintenance requirements: less need of chemical fertilizers, herbicides, and insecticides. Using less chemicals provides better water quality in the streams and rivers, more and better habitat for native wildlife, and more time for you to enjoy it. Regardless of whether the land you manage is a quarter of an acre, or a hundred acres, whether the land is your backyard, a school or church property, corporate or municipal lands, BasinScapes practices can work for you.

Long Term Planning- The most logical sequences in planning your landscape include the following steps: analyze the site for landscape potential; determine how lawn, trees, shrubs, and ground covers can be organized into a functional landscape that meets your planned uses; select plants that meet your landscape needs and enhance wildlife habitats; and carefully determine the hidden maintenance costs for the planned landscape, particularly water, fertilizer, and pesticide requirements. Implementing BasinScapes will result in the savings of time and money, while reducing the risk of polluted runoff leaving your lawn and landscape. You can also save on expensive heating and cooling costs through the proper placement of shade and evergreen trees and shrubs.

Using Native Plants- Native plants include those that require low inputs of fertilizers or pesticides, plants that require little supplemental watering and seasonal care, and plants that provide exceptional wildlife value, such as food and cover. The value of using native plants for pollution prevention comes from their minimal care requirements compared to other plants which may need high inputs of fertilizers, pesticides, or water to grow. The value to wildlife is critical, as we lose more and more habitats and food sources to urbanization. Using a wide variety of native plants helps to maintain the natural diversity of our local plant communities.

Conserving Water - BasinScapes can help save up to one-third of the water normally used in maintaining landscapes and gardens in the summer months. Efficient water use involves looking at how much water is used, when it used, how it is distributed to the lawn and garden, and how it can be conserved through techniques such as mulching and plant selection. Water lawns and plants only when they need it.

Creating Diversity- The Basins capes approach encourages the enhancement of conservation landscaping wherever you live and adds to the greening of cities and suburbs. You do not need a yard to BasinScapes. Container gardens can be created on a patio, balcony, or a window box, and are just as important to your

wildlife community as are properties with more green space. Water gardens, as simple as a shallow dish or tub of water with potted plants, provide valuable water sources for wildlife in any setting. Improving Wildlife Habitat- Creating a wildlife habitat means providing food, water, shelter,and nesting sites in the proper arrangements. Many plants, including native species, produce fruits, nuts, or berries that wildlife needs for food. Hedgerows of deciduous and evergreen shrubs provide excellent cover and nesting sites. Flowering perennial plants provide beautiful colors that attract butterflies and hummingbirds. By reducing the use of fertilizers and pesticides, your backyard landscape is safer for wildlife. When offered various natural sources of food, wildlife will visit your patio, terrace, balcony, or yard. Bird boxes and houses can bring songbirds to your back yard or patio to nest. Bat boxes will entice bats to set up housekeeping in your landscape, which helps control mosquitos and other annoying insects. Water, whether a small dish of water or a pond, is very important for wildlife.

Integrated Pest Management (IPM) - IPM uses a combination of biological, physical, and chemical methods to control pests. The IPM approach involves (1) accurate pest identification and monitoring; (2) evaluation of the risk or threat, and effective control methods; (3) physical/cultural controls such as physically removing the pest(s) or those areas of vegetation affected by the pest or disease; (4) biological controls such as the use of beneficial predator insects to control insect pests; and (5) accurate pesticide application to target species, including use of organic-based compounds such as insecticidal soaps when possible. If absolutely necessary, commercial pesticides should be used carefully and applied only to the targeted pest.

Chapter 3

3.1Research Methodology

3.1.2 Household Sampling Methods

Systematic random sampling methods have been employed to choose the households found in the study area. The bases for randomizing have been carried out by obtaining the housing number offered by the Woreda 05 & 10 Administration and GIS data base. Based on these 6,026 and 3,846 households are estimated in the two Woredas respectively. Out of these, about 900 households are estimated in Woreda 05 'Worku- sefer' and similarly 60 households are estimated in Woreda 10 Gelangura cobble stone project area. Thus the total households in the study area are about 960. Hence, to draw a representative sample of households (n) from the population the following formula used by Tiwari, A. and EzanaHaddis (2012) was used for one thousand households with commonly used confidence level were:-

t2X p (1-p) where, n is required sample size

n =

m2t is confidence level at 90% (standard value is 1.645)

p is the probability of sample (50%=0.5)

m is margin of errors at 10%(confidence interval is 0.1)

So that, (1.645)2X0.5 (1-0.5)

67.650625 ~ 68

n =

(0.1)2

Thus, from the total 960 households in the study area 68 housing units have been taken as a representative of the total population and studied for this paper. Therefore, based on more vulnerable to quarry operation problems in the study area, about 68 households have been systematically selected in the interval of 14 households to gather relevant data in the study area. the parallel lines (based on the area coverage and availability of woody vegetation from each land category in the study site). Hence, for tree and shrub assessment quadrants of 40m x 60m (2400m2) were placed next to each other at the interval of 100 -150 m, followed the transect line at each site. The aim was to have a minimum of two sample plots at each land category depending on its size. The surrounding woody species within 200 m distance from the quarry centre, excluding the working quarry were documented

In total twelve quadrants were sampled across the four land categories in the study area (annex C). Note, in all quadrats, additional trees and shrubs outside the quadrat boundaries but within 5m distance were collected and noted as present.

3.2 Data types

There were both primary and secondary data used for this study.

Primary datawere gathered by employing the following methods. A house to house survey have been conducted to gather data on the physical condition, field survey, site observation, unstructured interviews, open-questionnaire and field pictures

Secondary data used Addis Ababa structure Plan proposals Addis Ababa City EPA, NGOs, ORAAMP (Office for the Revision of Addis Ababa Master Plan) documents, and the academia were extensively used. Other important documents. Moreover, Internet browsing and literature reviewing of best practices from selected countries in the areas of sustainable landscapeconservation were discussed.

The primary data sources for this paper were obtained from the cross-sectional survey through questionnaire, interviews and observation. Questionnaires were collected from the community, quarry operators, workers, Sub City of AkakiKality Environmental Protection Office and Woreda 05 &10 Administrations and Addis Ababa City EPA. Questionnaire were administered to these groups of respondents to get their views and perception on the status and characteristics of the quarry operations based on the basic principles of environmental planning interventions for sustainable quarry rehabilitation program. In addition, extensive personal observations were also made to assess vegetation type and the environmental quality of the area.

Relevant secondary sources had also been consulted. Particularly, literatures including published reports, and unpublished sources from Federal institutions, Ethiopian legal frameworks of mining operation (policy, proclamation and regulations of mining activity), Moreover, Internet browsing and literature reviewing of best practices from selected countries in the areas of sustainable quarry rehabilitation planning and development were discussed.

3.3 Data analysis, interpretations and presentations

For the purpose of accomplishing the objectives of the study and to answer the research questions, the researcher edited, coded, classified and tabulated the collected raw data in order to make it ready for analysis. Information from primary and secondary sources was analyzed by using qualitative and quantitative methods. Data that have quantitative nature such as average, percentage and alike were compute with Microsoft Excel software.

Furthermore, spatial analyses have been conducted using GIS (Geographic Information System), Auto CAD software as analytical tools. Finally, the analyzed data were presented with maps, tables, graphs and pictures.

3.4 Sample Design

3.4.1 Sample Technique

The sampling method used for this study is mixed type that contains both probability and non-probability sampling to examine the landscape conditions of Meshualekia enough number of samples is obtained with this technique. In the non -probability sampling, purposive (judgmental) and in probability sampling, stratified sampling. In the stratified sampling the researcher categorized the town residents in to four characters such as elders, government employees, traders and ordinary people.The sample size could be seen as follows in the table

Table 1 sample size

No.	Sampling frame	No. of interview	Sampling technique
1	Resident	32	Simple random sampling
2	Cattle traders	3	Simple random sampling
3	Ordinary Residents	15	Simple random sampling
4	Municipality workers	6	Judgmental sampling
	Total	68	

3.4.1.1Observation

Observation is used conducted to see the real expansion (plot area coverage) and its effects on the Environment.

3.5 Data analysis, Interpretation and presentation

Raw data collected through questionnaire, Interview, and observation were carefully tallied, tabulated, and organized. Both quantitative and qualitative approaches of data analysis are used. The qualitative method are used to describe the findings qualitatively, while the quantitative one is analyzed using tables, charts, graphs, percentage, ratio, etc…Figures and photos is also used to interpret and summarize the findings where necessary.

Chapter 4

4.Analysis and findings

4.1. Description of the study area

4.1.1. Location

The study area is found inAkakiKality Sub City, Woreda 01, commonly known as ‘Meshualekia’ and to small extent in south east to Tirunesh Beijing hospital, the great Akaki River flowing from north east to south west direction through the bridge of meshualekia, The study area lies between 38046’30” E-38047’30” E latitudes and 80 55’15” N- 8056’15”N altitudes. It is characterized by juntleslopes covering significant portion of the river side’s.

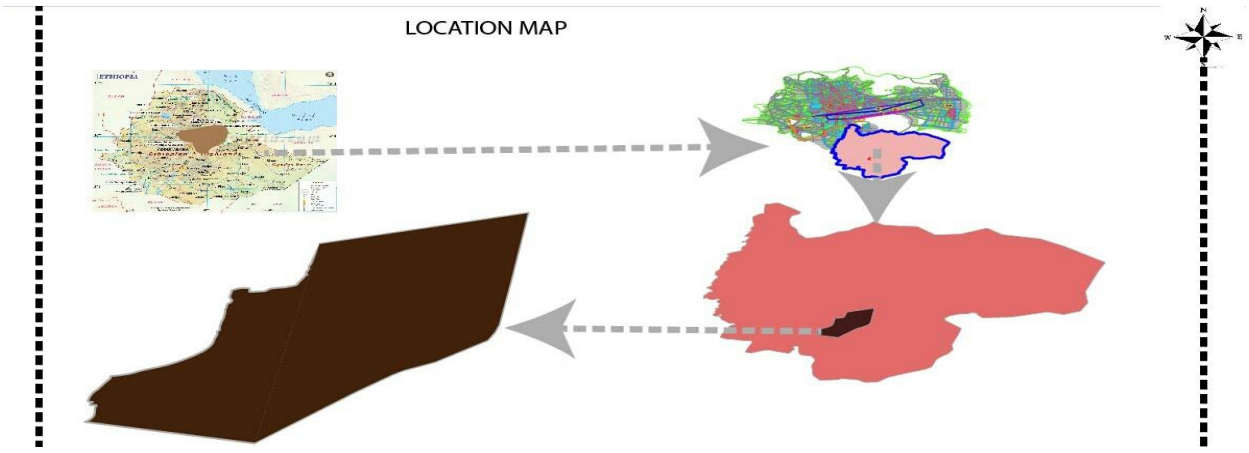

Figure 2 Location of the Study Area in Addis Ababa (Source: Addis Ababa City Base map, 2005)

Figure 3 partial view of the research area, meshualekia

4.1.2. Topography/relief of the study area

Topography is an important factor in most land planning decisions. Due this importance, having a topographic survey of a site is essential to make topographic maps at several scales. One of the methods to analyze physical configuration of any site topography is slope analysis.The topographic nature of the site under consideration is not uniform and its slope varies at different places:

- ✓ The northern part of the site is relatively found at higher elevation.
- ✓ The southern part of the site is found at lower elevation

This indicate that the site slope which found at the northern part is sensitive to soil erosion for this reason it has the impact on providing facility for the site. The slope of the area varies significantly from one area to another (see figure 4 in the next page), but it is dominated by flat area which is suitable for quarrying activities. The river side of the study area has slope greater than 20% which is covered by steep slope and is not suitable to any development initiative. Taking in to consideration, the structural plan of the city proposed those areas with slope of greater than 20% reserved for forest and restricted any types of development other than urban greenery.

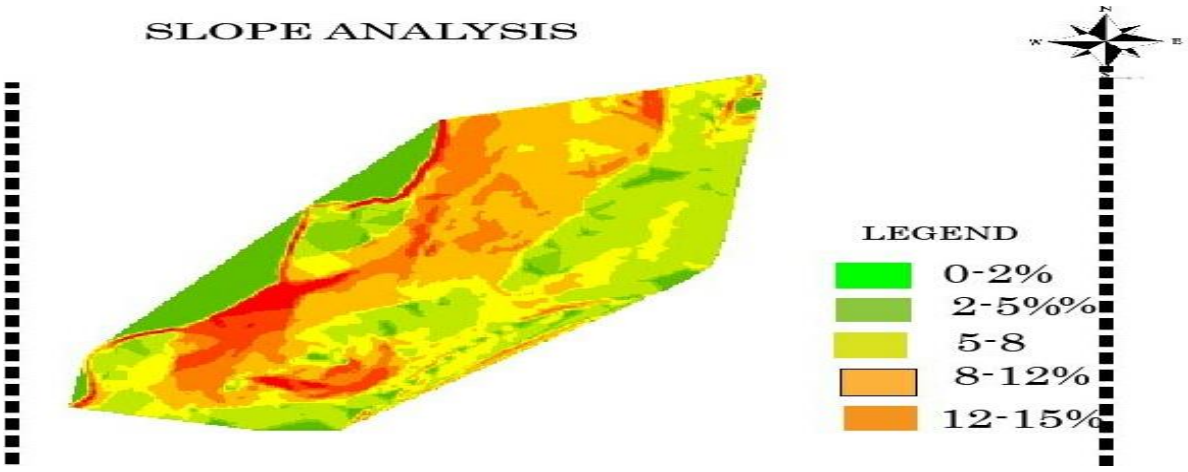

Figure 4 Slope map of the study area (Source: Addis Ababa City Base map, 2005)

4.2. Soil

4.2.1 Soil type

Knowledge of soil is very important; since soil property is directly related to the type of construction to be built in one area specially engineering capability and bearing capacity of the soil characteristics that should be studied earlier. Regarding the project site, after taking samples in different locations and through critical observation, it is found that the soil type of the site is silt mixed with clay which has low degree of swelling and thus the site is favorable for construction in terms of soil property.

4.2.2 Soil profile

Soil profile represents the vertical cross section of the soil that can vary from top to the bottom and can affect structures if the granular structure of the bottom layer of the soil is loose and weak. Hence, critical soil profile analysis is essential prior to any construction in a given area.

According to the study and observation made on the project site, the profile of the soil consist offsite soil, red clay soil, and black Cotton soil mixed with white gravel and rocky from top to bottom across its vertical cross section.

Soil profile

Silt soil
Red clay soil
Black cotton soil mixed with white gravel

Table 2: Soil profile of the project site

From the above table, we conclude that the site consists three types soil, this means the site has different permeability characteristics and it is possible for planting different species of trees.

4.2.3 Drainage characteristics

The drainage characteristics of a soil might refer to its capability to pass or filter water through its porous particles. Based on this, sandy soils are the most porous and can easily drain water but clay soils are poor to drain surface water.

Although clay soil dominates the site it is not as such heavy clay soil but it is clay soil mixed with white gravel which can drain easily with relatively low financial and technical cost. In general, the drainage characteristic of the site under consideration is not as such difficult.

4.3 Engineering property

Before any planning is begun, it is necessary to investigate the ground conditions of the selected site and one of the major properties of a soil that needs critical investigation is its bearing capacity. Regarding engineering property of a soil, the most suitable ground for building construction is the one which can support the greatest loads and pressure, namely rocks.

According to the analysis made on the soil profile during site observation and the information obtained from Keble of the project site, the bearing capacity of the soil in the given site is relatively good.

4.4 Climate

Atmospheric conditions that may influences land planning and design decisions include precipitation, air temperature, humidity, cloudiness, solar incidence, wind direction and wind speed.

The analysis of this project focuses on temperature, rain fall, wind direction and sun orientation. The challenge of the climatologically analysis of the site is that, it is not an overnight operation but it needs at least a decade data in a day-today or monthly basis. Although having all the climatologically data of the project site is important, it is difficult to find data for that specific site. Therefore, it is must to use data of the whale Addis Ababa and the data obtained from the office of meteorology look like as fallows

4.4.1 Temperature

Building materials selection and urban fabric design types are highly dependent on temperature and rain fall conditions of a given site. In Ethiopia, there are four known seasons called summer, autumn, winter and spring each has its own peculiar features and characteristics. Table 3.2and table 2 shows the monthly maximum and minimum temperature of summer season

Maximum Temperature minimum Temperature

Year(EC)	Jun	Jul	Aug		Year	Jun	Jul	Aug
1997	24.9	21.7	21.9		1997	11.7	11.3	11.5
1998	24.7	22.3	21.9		1998	11.2	11.7	12.6
1999	24.6	20.5	20.6		1999	10.3	10.5	10.4
2000	23.1	21.5	21.0		2000	10.6	11.0	11.0
2001	22.5	21.5	21.0		2001	10.7	11.1	11.6
2002	24.2	23.0	21.8		2002	11.4	11.3	13.0
2003	24.5	21.2	20.8		2003	11.7	117	11.8
2004	23.3	21.5	21.8		2004	11.3	11.0	15.1
2005	23.4	21.1	22.1		2005	15.1	11.3	11.4
2006	23.1	20.8	20.1		2006	11.0	10.7	10.8
2007	22.4	21.3	21.1		2007	11.1	11.1	11.0
Average	23.7	21.5	21.2		Average	11.5	11.1	11.8

Table 2 monthly minimum and maximum temperature of summer season

From the above table, it can be seen that, the average maximum temperature is 23.7ºC in June and the average minimum is 11.1ºc in July with a range of 12.6ºc.in the summer season. The peak maximum temperature was 24.9ºC in June 1997 and the minimum was 10.3ºC in the same month1999.

Table 3 monthly maximum and minimum temperatures of Autumn

Maximum temperatureminimum temperature

Year(EC)	Sep	Oct	Nov		Year	Sep	Oct	Nov
1997	23.3	23.1	22.8		1997	10.6	10.0	7.8
1998	21.9	22.2	22.8		1998	11.0	9.2	4.7
1999	22.1	21.9	22.7		1999	9.9	9.2	4.7
2000	21.1	22.5	22.9		2000	11.3	12.3	12.4
2001	22.9	24.7	24.2		2001	10.6	10.0	7.8
2002	22.4	24.3	24.3		2002	14.5	13.0	8.6
2003	21.9	23.7	23.6		2003	11.4	9.3	8.4
2004	21.5	22.3	23.7		2004	10.8	8.9	7.8
2005	22.4	23.6	22.9		2005	11.3	9.4	8.4
2006	21.6	24.2	23.5		2006	10.1	10.4	8.4
2007	20.3	22.4	22.1		2007	11.0	9.6	8.7
Average	21.9	23.2	23.2		Average	11.1	10.1	8.0

Table 4 Monthly maximum and minimum temperatures of Autumn

From the above table, it can be seen that, the average maximum temperature is 23.2ºc in October and November whereas the minimum temperature is 8º in November with arrange of 15.2ºc. The peak maximum temperature is 24.7ºC in October, 2001 and the minimum is 4.7ºc in November, 1998 respectively.

Table 5 monthly maximum and minimum temperatures of winter season

Maximum temperature minimum temperature

Year	Dec	Jan	Feb		Year	Dec	Jan	Feb
1997	24.2	23.4	25.2		1997	6.6	9.3	6.1
1998	23.2	24.3	25.0		1998	3.4	9.8	11.7
1999	22.7	24.7	26.7		1999	5.6	6.7	7.3

2000	23.8	25.0	25.5	2000	8.6	7.4	8.1
2001	24.2	23.5	25.2	2001	8.3	8.4	9.1
2002	23.8	24.2	26.2	2002	10.4	8.6	10.2
2003	22.8	24.3	26.2	2003	7.7	9.7	10.9
2004	24.0	25.1	25.2	2004	8.1	10.3	9.3
2005	22.9	24.1	25.8	2005	6.3	8.3	9.2
2006	22.8	23.8	25.0	2006	8.3	8.6	10.8
2007	22.0	23.6	24.7	2007	8.2	9.0	10.3
Average	23.3	24.2	25.5	Average	7.4	8.7	9.4

Table 6 Monthly maximum and minimum temperatures of winter season

From the above table, it can be seen that the average maximum temperature is 25.5ºc in February and the minimum is 7.4ºc in December with a range of 18.1ºC. The peak maximum temperature is 26.7oC in February, 1999 and the minimum is 3.4ºC in December, 1998 respectively.

Table 7 monthly maximum and minimum temperature of spring season

Maximum temperature minimum temperature

Year	Mar	Apr	May	Year	Mar	Apr	May
1997	26.0	24.5	26.9	1997	10.6	11.2	11.1
1998	25.4	26.6	25.2	1998	12.0	12.1	12.6
1999	25.5	27.6	26.9	1999	10.4	10.4	10.5
2000	27.3	25.7	25.4	2000	10.2	12.1	11.6
2001	24.0	25.5	24.3	2001	11.6	12.0	11.7
2002	25.0	25.7	26.0	2002	11.8	12.2	12.8
2003	26.3	25.1	26.8	2003	11.3	12.4	13.3
2004	25.5	23.7	26.8	2004	10.3	12.2	12.2
2005	25.4	26.1	24.0	2005	11.8	12.5	12.5
2006	24.5	24.3	25.1	2006	11.5	12.2	11.8
2007	25.9	24.4	25.0	2007	10.9	11.9	11.9
Average	25.5	25.4	25.7	Average	11.1	11.9	11.1

Table 8 Monthly maximum and minimum temperatures of spring season

From the above table it can be seen that, the average maximum temperature is 25.7ºc in May and the minimum is 11.1ºc in March and May with a range of 14.6 ºc. The peak maximum temperature is 27.6ºC in April, 1999 and the minimum is 10.4ºc in March and April 1999. Generally spring and winter are the hottest and coldest seasons respectively relative to others. The annual average maximum temperature is 23.7ºc and the annual average minimum temperature is 10.3ºc with a range of 13.4ºc in an increasing trend. More over the peck maximum temperature observed during the eleven years period was 27.6ºc in April 1999 and the minimum was 3.4ºC in December, 1998. However, this range has no significant impact on the type of park design and selection of specific construction materials in Addis Ababa.

4.4.2 Rain Fall

The intensity, duration and seasonality of rain fall have impact on type of construction and design of urban fabric. On high intensity and long duration rain fall area, durable and massive construction materials are required.

In Ethiopian, the rainfall distribution and duration varies in different seasons. Hence, the rain fall conditions of each season and the impact on construction of urban fabric should be investigated. The following tables show seasonal rain fall distribution in mm

Summer season rain fall distribution

Year	Mar	Apr	May
1997	128	257.0	160.7
1998	116.6	270.7	236.8
1999	104.6	294.0	270.5
2000	144.5	244.8	306.2
2001	213.5	428.0	246.4
2002	172.5	255.2	215.9
2003	151.8	291.8	233.3
2004	141.9	248.5	268.6
2005	179.8	246.0	315.2
2006	145.1	356.3	243.6
2007	157.3	191.3	-

Autumn season rain fall distribution

Year	Mar	Apr	May
1997	94.7	58.6	13.3
1998	173.4	139.4	0.0
1999	62.8	127.1	0.0
2000	250.6	46.4	21.1
2001	131.7	14.6	0.0
2002	108.8	0.2	0.0
2003	214.1	0.8	1.5
2004	164.0	76.9	0.0
2005	182.5	29.0	4.4
2006	239.1	54.0	4.5
2007	130.9	37.2	-

Average	150.53	280.3	207.11	Average	159.33	53.10	4.07

Table 9 Summer and Autumn season rain fall distribution

Winter season rain fall distribution Spring season rain fall distribution

Year	Dec	Jan	Feb	Year	Mar	Apr	May
1997	0.0	29.1	67.0	1997	76.0	66.8	74.8
1998	0.0	66.6	40.0	1998	43.8	99.8	197.7
1999	0.0	4.4	56.0	1999	77.0	66.0	73.0
2000	0.0	0.0	0.0	2000	2.4	49.9	110.0
2001	0.0	0.0	12.2	2001	210.8	25.0	168.0
2002	16.5	14.7	21.0	2002	90.1	50.5	63.1
2003	54.9	10.0	34.1	2003	62.6	99.3	20.2
2004	0.0	24.8	20.3	2004	49.5	139.9	30.1
2005	0.0	45.9	51.6	2005	83.2	160.9	150.0
2006	13.6	0.7	11.2	2006	124.3	71.9	74.9
2007	-	9.9	21.3	2007	61.1	86.8	134.0
Average	7.73	18.72	30.43	Average	80.7	83.89	99.59

Table 10 Winter and spring season rainfall distribution

From the above tables, it can be seen that, the summer and winter seasons receive the maximum and minimum amount of rain fall respectively. The annual rain fall of Addis Ababa is 1194. 7 mm but the peak maximum monthly rainfall observed from 1997-2007 was 428 mm in July, 2001. However, the amount and distribution of rain fall which is stated above could of highly influence the decision in construction type's fear of excessive flooding and damage on different structures.

4.4.3 Wind direction

According to Ethiopian meteorological services agency, the prevailing wind direction of the site during dry season September to May is mostly from North east to south west with speed of 6-12 m/s during humid season, the wind direction shows the reverse direction, i.e. from south west to north-east at 4-8m/s. Identification of wind direction can be used to determine the building arrangement, its openings and to provide wind barriers.

4.5 Sun orientation

The sun direction is commonly fallows east –west line with small deviation and Relative to the whole Addis Ababa, the same sun orientation is observed. This can also be used to determine the arrangements of some provided buildings and shading within the site.

4.6 Hydrology

In hydrological analysis; surface and subsurface water, the drainage pattern and catchments area should be studied. So the analysis focuses on surface water and drainage pattern of the site and its surroundings. The site has surface run off and drainage. So these help us how we manage surface run off and drainage system from the site.

Figure 5 Hydrological analysis

4.7Environmental Analysis

Environmental issues are analyzed based on data obtained from observations and interview. As it is interviewed and observed, the site in to consideration has:

- Lack of appropriate drainage and sewerage system that contributed for ill-health of the park users and the environment as well.
- Lack of waste collection system
- Solid waste damped into the site.
- There is no drainage system proposed or provided.

Figure 6 Solid waste disposed in the river creating a problem to the wild life

Figure 7 The solid waste damped in the river collected in the tries

4.7.1 Accessibility Analysis

Accessibility refers to the ease with which people can access a full range of facilities such as shops, leisure, etc. The availability of such facilities makes the place more meaningful whenever they are accessible to the widest range of people both in terms of its location and physical design of spaces and buildings.

In a wider scale, due to its strategic location (as it is one of the transition area), it is possible to say that the site has accessibility problems. The residents have no the possibility to access different advantages of the landscape as a recreational place.

To a smaller scale, the area is dominated with vegetation without adequate facilities like swimming pool, playground, recreation, and another public realm.

4.7.2. Visual Analysis

According to Cullen, *et.al,* a visual study of the area conforms more closely to the more traditional meaning of town escape. In relation to this it is possible to say that the area has complexity of visual details such as facades, pavements, roof line, street sculpture, etc. which distinguish one place from another.

The second figure shows the strong conservation practice shared by Akaki green park design, where the trees found on the site are kept alive and street was integrated with conservation landscaping.

Figure 8 Visually attractive features of the site

4.7.3. Diversity and proximity of activity and uses

When we built an area where the pattern of human activity contains only one element, it is impossible for the architecture to achieve a convincing variety (Jane Jacob, 1961). In order to

achieve such variety, thus, the area should promote diversity and proximity of uses and activities. In relation to this, as the site is predominantly by recreational area, it is less diversified because according to the information obtained from the survey, the users cannot get the necessary activities and uses required for their need such as shopping , recreation, open spaces and others. That means homogeneity of functions dominates the area.

Figure 9 The view of the site where cattle are sold in holidays

4.7.4 Movement

As my observation and interviewed individuals there is no any form of transportation system accessed to the landscapes. Because of the absence of street access to the landscapes.

Figure 10 the figure of the site where that doesn't encourage movement

4.8 Waste disposal System

When we come up waste disposal system we come up with solid waste disposal system and liquid waste disposal system.

- The solid wastes are damped on surface of the area there is no provided dust bines with in the park.
- The liquid waste and surface run off also flow on the surface of the earth there is no provided liquid waste disposal system.

Figure 11 Higher trees and different species types

4.9 Safety and Security

It is true that safety and security of a community brings stability, growth and development of that community. It can be seen in terms of environment, crime, etc. within the site as: Environmentally, the area is relatively safe and secure as compared to inner city areas except some poor solid and liquid waste management problems. It is also free from geological hazards such as landslides, seismic waves and earth quake.

The information obtained from the inhabitants of the area indicates that there is no as such significant criminal activity in the area but sometimes there is the existence some juvenile delinquents and wild animals like hyena which makes the fear of accessing through the landscapes because the area was covered with higher trees.

Figure 12 Higher trees and different species types

4.10. Stakeholder analysis

In stakeholder analysis there are different groups, individuals and institutions who are affected by the problem of existing park situation directly or indirectly. So these stakeholders who are affected by the problems are the key stakeholders in solving the park utilization problems. For example, the society, government body, nongovernmental organization, private ownership and every individual who are affected directly or indirectly are the stakeholder. As mentioned from Addis Ababa beautification, park and cemetery sustainable development agency and the inhabitants there are both internal and external stakeholders.

4.11 Conclusion

In the past decades, the global dimensions of urbanization and population growth have reached on its threshold. This creates various problems in urban areas in all dimensions of social, political and economic conditions of urban areas. Among those problems, the most critical one is lack of appropriate conserved and protected landscapes which regulate the natural system. The poor management of landscape in Addis Ababa city has made the city lose its name meaning which directly is an element of the landscape, new flower.

Different stakeholders play important roles in conserving the landscapes and solve the problems around. The key stakeholders are project designers and developers, national, regional, local government, public authorities, potential partners, financial institutions, educational centers and environmental organization.

Having a large number of conserved landscapes increase the likelihood of being physically active and productive in overall life of human being. This conserved landscape encourages a city to have lots of trials, play grounds and sport facilities while stimulating higher levels of landscape boned physical activity.

Generally, addressing the issue of protected landscape is a complex task. The problem cannot be solved by design alone or by anyone's single action. What is required create and maintain a beautiful landscape is an integrated task involving design, programming maintenance and overall citizens involvement.

4.12 Recommendations

The purpose of the conservation of Meshoalekia's site is not limited to conserving the site only. It goes far to creating benefit to the world's environment. This is because this concept is a rapidly growing concept and people from different nations are working together across large geographies of the world regardless of political boundaries.

Therefore, the conservation of the landscape of Meshoalekia needs a long-term effort from both governmental organizational and the people in there.

- Planners and Designers need to use a science based and culturally sensitive conservation planning as Ethiopia has its own cultures which give respect to the nature its people dwells

in. Both formal and informal with multi-sector engagement collaborative should be applied for the conservation planning to be sustainable. This is because without the support of the majority of the local community, realization of the conservation objectives will be impossible.

- In addition, the government planners should create awareness in the people to understand the concept that conservation of landscape is not just about a today's benefit, but a task to be done with future generations to come in mind where everybody in the community will try to project the nature around his/her home.
- In Africa green park, I've found out that the concept of conservation landscaping is applied in most parts of the park where they've achieved to conserve 18,000m^2 of the park's part with green plantations which existed on the place previously by working with nature rather than against nature as you see in the figure below. This kind of landscape conservation should be encouraged in all parts of the site so as it will also be a best exemplary practice for other areas.
- Long term planning should be done, as many of the plans in Ethiopia are short-life plans which are not sustainable but this time, landscape conservation is a concept which demands a wel-thought and long-lasting conservation planning.
- Native plants which require low inputs of fertilizers of pesticides, plants that require little supplemental watering and seasonal care should be used as plantations.
- Water is the base and source of life. This implies that polluted water means a polluted wildlife. The river in Meshoalekia is extremely polluted with the discharges from different factories in Addis Ababa the Akaki river. The government should take measures out improving water quality of the river, so as to keep the ducks in Meshoalekia alive for the future and also bring other aquatic life furthermore.
- It's better if the conserved landscapes be accessible to the public as human beings are also parts of the landscapes. This can be done through the provision of recommended playgrounds, parks and recreational areas in the landscape.
- In addition, the government also need to create ways that the flooding of the river could be controlled through design measures.

- The stakeholders should develop landscape planning and design due to the presence of different free species, historical places and favorable weather conditions, stakeholders should develop ways to strengthen conserved landscapes by making recreational places at the same time creating source of business like parks.
- Different recreational infrastructures, drainage systems, river pollution prevention structures should be well established

Reference

Arendt, Randall, and Robert D. Yaro. "Rural Landscape Planning in the Connecticut River Valley of Massachusetts." *APT Bulletin 21*, no. 2 (1989): 13-20.

Bernard, Ted, and Jora Young. *The Ecology of Hope: Communities Collaborate for Sustainability.* Gabriola Island, BC and East Haven, CT: New Society Publishers, 1997

Brown, Jessica L., and Brent A. Mitchell,eds. "Stewardship: An International Perspective." Environments 26, no.1(1998). Brown, Jessica, Nora Mitchell, and Fausto Sarmiento, guest eds. George Wright Society. *Research in Protected Areas.* Papers from IV World Congress on National Parks and Protected Areas. *The George Wright Forum* 9, nos. 3 and 4 (1992).

Groth, Paul, and Todd W. Bressi, eds. *Understanding Ordinary Landscapes.* New Haven: Yale University Press,1997.

Landscape Stewardship: New Directions in Conservation of Nature and Culture, The George Wright Forum 17, no. 1 (2000).

McNeely, Jeffrey A., and David Pitt. *Culture and Conservation: The Human Dimension of Environmental Planning.* London and New York, Croom Helm, 1985.

Protected Landscapes, Experience Around the World. Gland and Cambridge: IUCN, 1987.

Holy Bible: Easy to Read Version (ERV) 1987, 2004 World bible translation Centre, a subsidiary of Bible League International.

Appendix: 1

ADDIS ABABA SCIENCE AND TECHNOLOGY UNIVERSITY

Department of Urban planning & design

Questionnaire prepared for municipality staff members

Dear Addis Ababa city Administration, Akaki Kality sub city planning office staff members, I am from graduating class of Addis Ababa science and technology university. By this time, I am on the way to prepare my senior essay research work on Meshualekia. It needs your polite and active involvement in responding to the questions that follow. The main objective of the questionnaire is to collect accurate information from you and prepare my senior essay report that focus on examining the causes of Meshualekia landscape conservation problems? Please share me your idea that is relevant and accurate to the research work. Thank you in advance

1. Did you think Meshoualekia's landscape is conserved?
   A. Yes
   B. No
2. What is the current condition of the area?
   Explain----------

   ---
3. During the past five years the areas conservation has
   A. Increased
   B. Remained constant
   C. Decreased
4. Is there any conservation made to solve Meshulekia's landscape conservation problem?
   A. Yes
   B. NO
5. If the above answer is No, why?
   Explain----------

   ---

6. What are the challenges you face in doing the conservation plan?
   A. Financial Challenges
   B. Management Challenges
   C. Social Challenges
   D. Design Challenges
   E. If others

      ---

7. What attention has been given towards Meshualekia's landscape conservation?

   ---.

Appendix 2

Questionnaire

1. Do you think Meshualekia's landscape is well conserved protected?
   A. Yes
   B.
2. What is the current condition of Meshualekia's landscape?
   Explain----------

   ---
3. During the past five years, what activities were held in this area?
   Explain----------

   ---
4. What do you think should be done to protect this natural landscape?
   Explain----------

   ---
5. Do you use Akakigreen park?
   A. Yes
   B. No
6. If your answer of question number 5 is yes, when do you use the park?
   A. From Monday-Friday
   B. Saturday and Sunday
7. Is AkakiGreen Park accessible?
   A. Yes
   B. No
8. If the above answer is No, why?

   ---
9. What do you feel about the conservation of Meshualekia's landscape?

A. Very good C. Bad

B. Good D. Very Bad

10. If you have any idea that would support the ways to conserve this area, please describe it on the space provided below

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